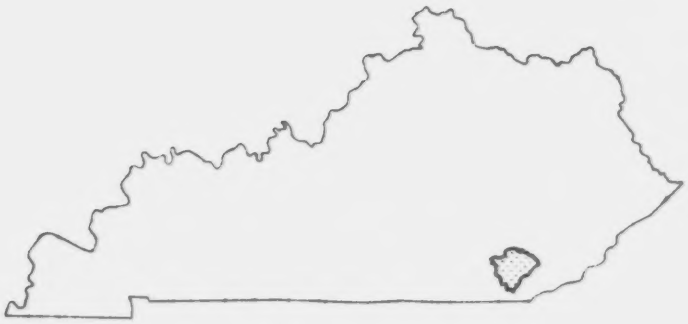
FLOOD INSURANCE STUDY

KNOX COUNTY, KENTUCKY

UNINCORPORATED AREAS



MAY 17, 1989

Federal Emergency Management Agency

COMMUNITY NUMBER - 210131

NOTICE TO
FLOOD INSURANCE STUDY USERS

Communities participating in the National Flood Insurance Program have established repositories of flood hazard data for floodplain management and flood insurance purposes. This Flood Insurance Study may not contain all data available within the repository. It is advisable to contact the community repository for any additional data.

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Flood Insurance Rate Map

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FLOOD INSURANCE STUDY

KNOX COUNTY,
UNINCORPORATED AREAS,
KENTUCKY

1.0 INTRODUCTION

1.1 Purpose of Study

This Flood Insurance Study investigates the existence and severity of flood hazards in the Unincorporated Areas of Knox County, Kentucky, and aids in the administration of the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. This study has developed flood risk data for various areas of the community that will be used to establish actuarial flood insurance rates and assist the community in its efforts to promote sound floodplain management. Minimum floodplain management requirements for participation in the National Flood Insurance Program are set forth in the Code of Federal Regulations at 44 CFR, 60.3.

In some states or communities, floodplain management criteria or regulations may exist that are more restrictive or comprehensive than the minimum Federal requirements. In such cases, the more restrictive criteria take precedence and the state (or other jurisdictional agency) will be able to explain them.

This Flood Insurance Study was prepared by compiling existing hydrologic and hydraulic technical and scientific data prepared by the Federal Emergency Management Agency (FEMA) for purposes of the National Flood Insurance Program and by other organizations for purposes other than the National Flood Insurance Program.

The data were identified as applicable at the time of compilation of this Flood Insurance Study and should depict the general conditions of the flooding sources with relative accuracy. FEMA performed a cursory review and accepted the data as valid for purposes of this Flood Insurance Study and the National Flood Insurance Program. However, if better information is known to exist or has been developed since the date of this report, the information should be immediately forwarded to the Natural and Technological Hazards Division, FEMA, 1371 Peachtree Street, NE., Suite 736, Atlanta, Georgia 30309, for consideration for revision of this study.

1.2 Authority and Acknowledgments

The sources of authority for this Flood Insurance Study are the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973.

The hydrologic and hydraulic analyses for this study were performed by the U.S. Geological Survey (USGS) (the Study Contractor) for FEMA, under Inter-Agency Agreement No. EMW-85-E-1823, Project Order No. 4. This study was completed in July 1986.

Additional hydrologic and hydraulic analyses for this study were obtained from U.S. Army Corps of Engineers (COE) reports for the Cities of Corbin and Barbourville, Kentucky (References 1 and 2).

1.3 Coordination

On September 24, 1987, the results of this Flood Insurance Study were reviewed and accepted at a final coordination meeting attended by representatives of the Study Contractor, FEMA, and the community.

2.0 AREA STUDIED

2.1 Scope of Study

This Flood Insurance Study covers the unincorporated areas of Knox County, Kentucky. The area of study is shown on the Vicinity Map (Figure 1). The incorporated areas within the county were excluded from this study.

Flooding caused by overflow of the Cumberland River, the Cumberland River High Flow Diversion Channel, Lynn Camp Creek, Richland Creek, and East Fork Lynn Camp Creek was studied in detail.

Approximate analyses were used to study those areas having low development potential or minimal flood hazards.

The areas studied were selected with priority given to all known flood hazard areas and areas of projected development or proposed construction through July 1991. The scope and methods of study were proposed to and agreed upon by FEMA and Knox County.

2.2 Community Description

Knox County is in southeastern Kentucky. It is bordered on the northwest by Laurel County, on the northeast by Clay County, on the southeast by Bell County, and on the southwest by Whitley County. Knox County is served by U.S. Route 25E, State Routes 6, 11, 229, and 830, and the CSX railroad. The 1980 population of Knox County was reported to be 30,239 (Reference 3).

2.3 Principal Flood Problems

Several destructive floods have occurred in the Upper Cumberland River basin in the vicinity of Barbourville. These include the floods of 1946, 1957, 1970, 1973, and 1977.

The 1957 Flood on Lynn Camp Creek had an estimated elevation of 1,072.2 feet National Geodetic Vertical Datum of 1929 (NGVD) and a discharge of 9,000 cubic feet per second (cfs) at the East Barbourville Street bridge in Corbin.

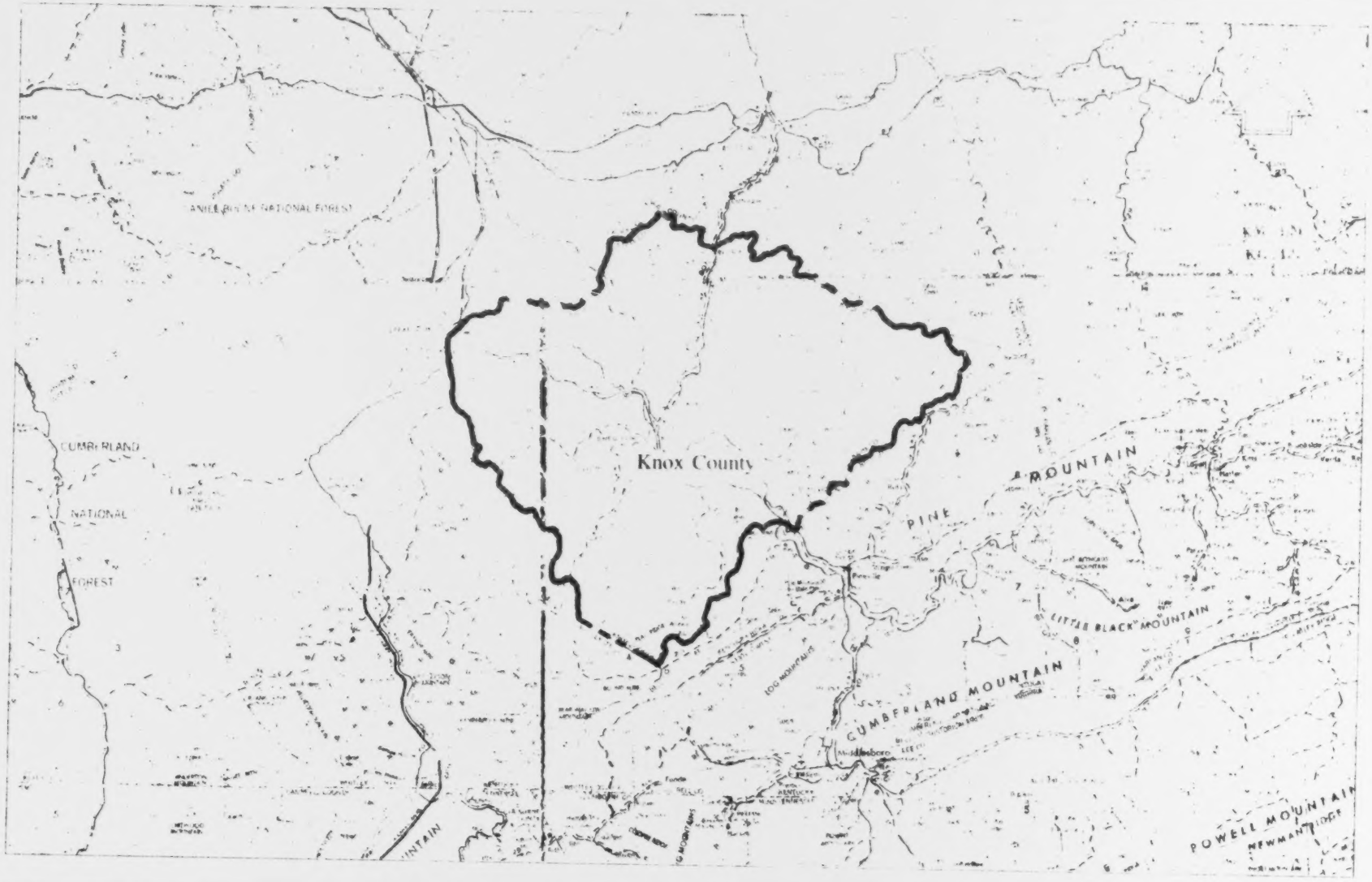


FIGURE 1

FEDERAL EMERGENCY MANAGEMENT AGENCY

KNOX COUNTY, KY
(UNINCORPORATED AREAS)

APPROXIMATE SCALE

8 0 8 16 24 MILES

VICINITY MAP

According to local residents, the 1957 and 1977 floods on East Fork Lynn Camp Creek are the highest floods of record and are comparable in magnitude. No high-water profiles exist for the study reach, but based on high-water marks supplied by local residents, the 1957 flood has an estimated recurrence interval of 25 years. Only a few dwellings around Siler, Kentucky, were affected by the 1957 and 1977 floods. Some land with the potential for development in the study area is within the flood hazard area. This is especially true of the area extending from Siler to the upstream end of the study reach.

2.4 Flood Protection Measures

The City of Barbourville is currently protected by a modified earthen levee that extends approximately 1,700 feet south of the corporate limits of the city. The modified levee consists of a 2,800-foot floodwall constructed on top of the original levee, 800 feet downstream of State Route 11 and 2,000 feet upstream of State Route 11.

Downstream of Barbourville, the 5,000-foot Cumberland River High Flow Diversion Channel has been constructed. This channel will allow water to bypass several miles of the Cumberland River natural channel and will lower the maximum flood elevations in the city. The invert of the diversion channel is 25 feet above the streambed of the Cumberland River; therefore, it is operative only during periods of high flow. The invert has to be low enough to divert flow away from the existing channel but high enough to minimize the aggradation/degradation of the section of river channel affected by the diversion. The optimum invert elevation was determined to be approximately the 5-percent exceedence water-surface elevation of the river, i.e., the diversion channel operates approximately 5 percent of the time each year.

It has been determined that the modified levee, with three feet of freeboard, combined with the Cumberland River High Flow Diversion Channel, will effectively protect Barbourville against the 100-year flood (Reference 2).

Construction of the Martins Fork Reservoir Project upstream of Barbourville was completed in 1978. Routing studies performed for the Martins Fork justification analyses defined historical flood "holdouts" at Barbourville, which were subtracted from natural flows to obtain regulated flows for historical and various frequency floods. The routing studies showed that the project reduces floods at Barbourville by an average of 0.5 foot.

There are currently no flood control structures on East Fork Lynn Camp Creek. Channel improvements on Lynn Camp Creek at the City of Corbin were completed in September 1964. Those improvements included the enlargement of the natural channel and the construction of a cutoff channel. This work was initiated as a result of the damage in Corbin caused by the 1957 flood. The resulting projected decrease of the 1957 flood profile and the intermediate regional flood profile elevations on Lynn Camp Creek at Corbin are shown in the COE Flood Plain Information Report for Corbin (Reference 1). These improvements somewhat diminish

the backwater effect on East Fork Lynn Camp Creek at the lower end of the study reach.

3.0 ENGINEERING METHODS

For the flooding sources studied in detail in the community, standard hydrologic and hydraulic study methods were used to determine the flood hazard data required for this study. Flood events of a magnitude that is expected to be equaled or exceeded once on the average during any 10-, 50-, 100-, or 500-year period (recurrence interval) have been selected as having special significance for floodplain management and for flood insurance rates. These events, commonly termed the 10-, 50-, 100-, and 500-year floods, have a 10-, 2-, 1-, and 0.2-percent chance, respectively, of being equaled or exceeded during any year. Although the recurrence interval represents the long-term average period between floods of a specific magnitude, rare floods could occur at short intervals or even within the same year. The risk of experiencing a rare flood increases when periods greater than 1 year are considered. For example, the risk of having a flood that equals or exceeds the 100-year flood (1-percent chance of annual exceedence) in any 50-year period is approximately 40 percent (4 in 10), and, for any 90-year period, the risk increases to approximately 60 percent (6 in 10). The analyses reported herein reflect flooding potentials based on conditions existing in the community at the time of completion of this study. Maps and flood elevations will be amended periodically to reflect future changes.

3.1 Hydrologic Analyses

Hydrologic analyses were carried out to establish the peak discharge-frequency relationships for each riverine flooding source studied in detail affecting the community.

For the Cumberland River, three historical flood-discharge hydrographs for the floods of January 1970, November 1973, and April 1977 were used in the derivation of the adopted unit hydrograph. That hydrograph was defined by averaging the unit hydrograph ordinates derived for each event. The validity of using the adopted unit hydrograph was verified when it was found that the hydrograph could be used to accurately reproduce the three largest floods of record that have occurred at Barbourville since 1959 (Reference 2).

The unit hydrograph for Richland Creek was based on Snyder's constants developed for Yellow Creek at the City of Middlesboro, Kentucky. Yellow Creek is a stream with a drainage basin very similar to that of Richland Creek, and its unit hydrograph has reproduced three of the larger floods on Yellow Creek. The Snyder's constants used agreed closely with Snyder's constants developed at other locations in the Upper Cumberland River basin.

The adopted unit hydrographs were applied to the rainfall excess and produced peak discharges of 115,000 and 26,000 cfs for the Cumberland River and Richland Creek, respectively.

Peak discharge-frequency relationships for Lynn Camp Creek were established using available runoff records and computed floodflows.

The 100-year discharge for East Fork Lynn Camp Creek was determined using USGS procedures (Reference 4). Drainage areas for computation of peak flows were determined from topographic maps (Reference 5). A peak discharge-frequency analysis was made on gaged small drainage basins in the vicinity of the study area, but no correlation was determined between sites. For this reason, the USGS procedures (Reference 4) were used to determine peak discharges for areas less than ten square miles. No adjustments were made for urbanization.

Peak discharge-drainage area relationships for the 100-year flood of each flooding source studied in detail in the community are shown in Table 1.

TABLE 1 - SUMMARY OF DISCHARGES

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (SQ MILES)	PEAK DISCHARGE (CFS) 100-YEAR
CUMBERLAND RIVER		
just downstream of State Route 11	960	68,000
RICHLAND CREEK		
at confluence of Cumberland River	74.0	12,000
EAST FORK LYNN CAMP CREEK		
at mouth	26.97	5,170
just upstream of confluence of Youngs Creek	21.94	4,510
at Johnson Road	21.28	4,420
just upstream of confluence of Negro Creek	9.95	2,680
just upstream of confluence of Indian Creek	7.97	2,310
LYNN CAMP CREEK		
at East Masters Street	53.80	10,800

3.2 Hydraulic Analyses

Analyses of the hydraulic characteristics of flooding from the sources studied were carried out to provide estimates of the elevations of floods of the selected recurrence intervals.

Cross sections and dimensions of backwater-producing structures were obtained by field survey to observe structural geometry and elevation data.

Locations of selected cross sections used in the hydraulic analyses are shown on the Flood Profiles and on the Flood Insurance Rate Map.

The HEC-2 computer program (Reference 6) was used to establish flood profiles for the Cumberland River and Richland Creek. The backwater model was calibrated by adjusting the cross-section geometry to accurately define effective flow area and by adjusting Manning's roughness coefficients to reproduce the January 1970 and April 1977 flood profiles. The resulting Manning's "n" values were 0.045 to 0.053 for the channel and 0.10 for the overbanks.

The 100-year flood profile for the Cumberland River was determined using two backwater models in conjunction: the existing model, adapted to reflect the modified levee, and a new model for the Cumberland River High Flow Diversion Channel, with Manning's "n" values of 0.035 and 0.10 for the channel and overbanks, respectively. At the upstream junction of the Cumberland River and the diversion channel, the contraction and expansion losses were increased to account for turbulence.

Backwater computations were started 4.4 miles downstream of the diversion channel. Using a discharge of 115,000 cfs, the two models were used in conjunction to determine the flow/elevation balance and the 100-year flood profile. A sensitivity analysis was performed on the flow distribution to determine the effects of less flow entering the diversion. That analysis showed that if the flow distribution was off by 50 percent, flood heights would not increase by more than 1.5 feet at the Barbourville gage. The 100-year flood is not contained within the Cumberland River High Flow Diversion Channel; however, because the diversion channel reduces maximum flood elevations, the 100-year event does not flood additional areas. Furthermore, the possibility of a slight rise in water-surface profiles due to a small loss of conveyance behind the levee is more than offset by the flood elevation reductions afforded by the diversion channel. Because of the large amount of flow area in the low left overbank, the State Route 11 bridge does not constrict the flows (Reference 2).

In the absence of streamflow records, the magnitude and timing of floods on Richland Creek were determined by centering 100-year storms over the Cumberland River basin above Barbourville. The profile was greatly influenced by the Cumberland River elevation at the mouth of Richland Creek. As a result, the water-surface slope was very flat through the levee reach.

For Lynn Camp Creek, roughness values ranged from 0.035 to 0.070 for the main channel and from 0.070 to 0.280 for the overbank areas. The HEC-2 and WSPRO computer programs (References 6 and 7) were used to compute the 100-year water-surface elevations for the creek. The starting water-surface elevation was determined using backwater calculations.

For East Fork Lynn Camp Creek, roughness coefficients were assigned in the field and adjusted based on stereo photographs and information from "Roughness Characteristics Of Natural Channels" (Reference 8). Roughness values averaged from 0.050 for the main channel to 0.070 for the overbank areas. The WSPRO computer program (Reference 7) was used to compute the 100-year water-surface profile for the study reach. Backwater from the 100-year flood on Lynn Camp Creek was used as the starting water-surface elevation for East Fork Lynn Camp Creek in the WSPRO program.

Flood profiles were drawn showing the computed water-surface elevations for floods of the selected recurrence intervals.

Areas of the community protected by levees are subject to potential risk due to possible failure or overtopping of the levee. These areas were delineated by applying the 100-year elevation determined from the "levee in place" analysis.

The hydraulic analyses for this study are based on the effects of unobstructed flow. The flood elevations shown on the profiles are thus considered valid only if hydraulic structures remain unobstructed, operate properly, and do not fail.

All elevations are referenced to the NGVD. Elevation reference marks used in this study are shown on the map and described in the exhibit labeled Elevation Reference Marks.

4.0 FLOODPLAIN MANAGEMENT APPLICATIONS

The National Flood Insurance Program encourages State and local governments to adopt sound floodplain management programs. Therefore, each Flood Insurance Study provides 100-year flood elevations and delineations of the 100- and 500-year floodplain boundaries and 100-year floodway to assist communities in developing floodplain management measures.

4.1 Floodplain Boundaries

To provide a national standard without regional discrimination, the 1-percent annual chance (100-year) flood has been adopted by FEMA as the base flood for floodplain management purposes. The 0.2-percent annual chance (500-year) flood is employed to indicate additional areas of flood risk in the community. For each stream studied in detail, the 100- and 500-year floodplain boundaries have been delineated using the flood elevations determined at each cross section. Between cross sections, the boundaries were interpolated using topographic maps at a scale of 1:24000 with a contour interval of 20 feet (Reference 5).

The 100-year floodplain boundary is shown on the Flood Insurance Rate Map. On this map, the 100-year floodplain boundary corresponds to the boundary of the areas of special flood hazards (Zones A, AE, AH, AO, A99, V, and VE). Small areas within the floodplain boundaries may lie above the flood elevations but cannot be shown due to limitations of the map scale and/or lack of detailed topographic data.

For the streams studied by approximate methods, only the 100-year floodplain boundary was delineated using the Flood Hazard Boundary Map for Knox County, Kentucky (Reference 9).

Some areas of the community that are protected from the 100-year flood by a levee have been delineated as having potential risk due to possible failure or overtopping of the levee during larger floods.

4.2 Floodways

Encroachment on floodplains, such as structures and fill, reduces the flood-carrying capacity, increases the flood heights and velocities, and increases flood hazards in areas beyond the encroachment itself. One aspect of floodplain management involves balancing the economic gain from floodplain development against the resulting increase in flood hazard. For purposes of the National Flood Insurance Program, a floodway is used as a tool to assist local communities in this aspect of floodplain management. Under this concept, the area of the 100-year floodplain is divided into a floodway and a floodway fringe. The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 100-year flood can be carried without substantial increases in flood heights. Minimum Federal standards limit such increases to 1.0 foot, provided that hazardous velocities are not produced. The floodways in this study are presented to local agencies as minimum standards that can be adopted directly or that can be used as a basis for additional floodway studies.

The floodways for this study were computed for certain stream segments on the basis of equal conveyance reduction from each side of the floodplain. Floodway widths were computed at cross sections. Between cross sections, the floodway boundaries were interpolated. The results of the floodway computations are tabulated for selected cross sections and are shown in Table 2, Floodway Data. The computed floodways are shown on the Flood Insurance Rate Map. In cases where the floodway and 100-year floodplain boundaries are either close together or collinear, only the floodway boundary is shown. Portions of the floodway for Richland Creek lie within an area not included in this study.

Along streams where floodways have not been computed, the community must ensure that the cumulative effect of development in the floodplain will not cause more than a 1.0-foot increase in the base flood elevations at any point within the community.

FLOODING SOURCE			FLOODWAY		BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	[illegible][2]	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET SEC.)	REGULATORY (FEET NGVD)	WITHOUT[3] FLOODWAY (FEET NGVD)	WITH FLOODWAY (FEET NGVD)	INCREASE (FEET)
RICHLAND CREEK								
A	0.91	140	2774	4.3	986.0	971.3	972.1	0.8
B	1.3	154	2962	4.3	986.0	972.9	973.8	0.9
C	1	142	1951	6.2	986.0	973.0	974.0	1.0
D		414	4864	3.2	986.0	974.0	974.8	0.8
E		345	5734	2.6	986.0	974.7	975.6	0.9
F	[illegible]0	409	7124	2.1	986.0	975.0	976.0	1.0
G	[illegible]8	148	2232	5.4	986.0	975.0	976.0	1.0

[1]MILES ABOVE MOUTH
[2]THIS WIDTH EXTENDS WITHIN AREA NOT INCLUDED
[3]ELEVATIONS WITHOUT CONSIDERING BACKWATER EFFECT FROM CUMBERLAND RIVER

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

KNOX COUNTY, KY
(UNINCORPORATED AREAS)

FLOODWAY DATA

RICHLAND CREEK

The area between the floodway and the 100-year floodplain boundaries is termed the floodway fringe. The floodway fringe encompasses the portion of the floodplain that could be completely obstructed without increasing the water-surface elevation of the 100-year flood by more than 1.0 foot at any point. Typical relationships between the floodway and the floodway fringe and their significance to floodplain development are shown in Figure 2.

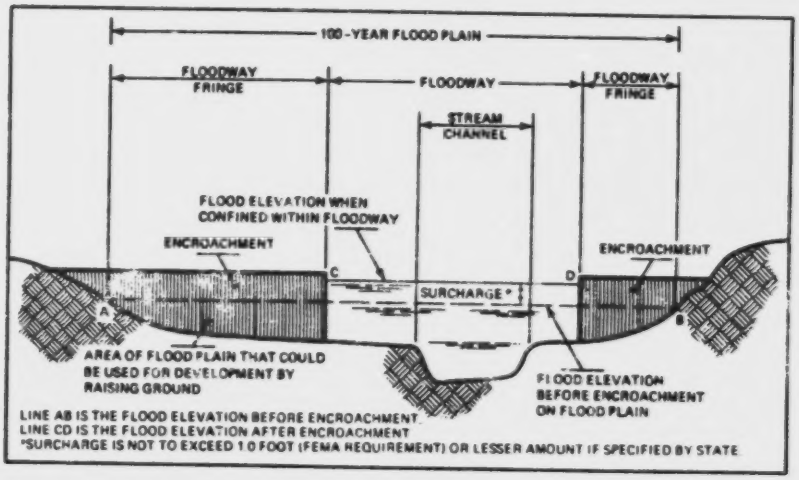

100-YEAR FLOOD PLAIN
FLOODWAY FRINGE
FLOODWAY
FLOODWAY FRINGE
STREAM CHANNEL
FLOOD ELEVATION WHEN CONFINED WITHIN FLOODWAY
ENCROACHMENT
ENCROACHMENT
C
D
SURCHARGE *
A
B
AREA OF FLOOD PLAIN THAT COULD BE USED FOR DEVELOPMENT BY RAISING GROUND
FLOOD ELEVATION BEFORE ENCROACHMENT ON FLOOD PLAIN
LINE AB IS THE FLOOD ELEVATION BEFORE ENCROACHMENT
LINE CD IS THE FLOOD ELEVATION AFTER ENCROACHMENT
*SURCHARGE IS NOT TO EXCEED 1.0 FOOT (FEMA REQUIREMENT) OR LESSER AMOUNT IF SPECIFIED BY STATE

FIGURE 2 - Floodway Schematic

5.0 INSURANCE APPLICATION

For flood insurance rating purposes, flood insurance zone designations are assigned to a community based on the results of the engineering analyses. These zones are as follows:

Zone A

Zone A is the flood insurance rate zone that corresponds to the 100-year floodplains that are determined in the Flood Insurance Study by approximate methods. Because detailed hydraulic analyses are not performed for such areas, no base flood elevations or depths are shown within this zone.

Zone AE

Zone AE is the flood insurance rate zone that corresponds to the 100-year floodplains that are determined in the Flood Insurance Study by detailed methods. Whole-foot base flood elevations derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

Zone AH

Zone AH is the flood insurance rate zone that corresponds to the areas of 100-year shallow flooding (usually areas of ponding) where average depths are between 1 foot and 3 feet. Whole-foot base flood elevations derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

Zone X

Zone X is the flood insurance rate zone that corresponds to areas outside the 100-year floodplain, areas of 100-year flooding where average depths are less than 1 foot, areas of 100-year flooding where the contributing drainage area is less than 1 square mile, and areas protected from the 100-year flood by levees. No base flood elevations or depths are shown within this zone.

6.0 FLOOD INSURANCE RATE MAP

The Flood Insurance Rate Map is designed for flood insurance and floodplain management applications.

For flood insurance applications, the map designates flood insurance rate zones as described in Section 5.0 and, in the 100-year floodplains that were studied by detailed methods, shows selected whole-foot base flood elevations or average depths. Insurance agents use the zones and base flood elevations in conjunction with information on structures and their contents to assign premium rates for flood insurance policies.

For floodplain management applications, the map shows by tints, screens, and symbols the 100- and 500-year floodplains, the floodways, and the locations of selected cross sections used in the hydraulic analyses and floodway computations.

7.0 OTHER STUDIES

A Flood Insurance Study published for Bell County, Kentucky (Reference 10) and a Flood Insurance Rate Map printed for Clay County, Kentucky (Reference 11) are in agreement with this study.

A Flood Insurance Study in progress for Whitley County, Kentucky, and a revision in progress to the Flood Insurance Study for the City of Barbourville, Kentucky (References 12 and 13) are in agreement with this study.

This Flood Insurance Study supersedes the previously printed Flood Hazard Boundary Map for Knox County (Reference 9).

8.0 LOCATION OF DATA

Information concerning the pertinent data used in the preparation of this study can be obtained by contacting the Natural and Technological Hazards Division, FEMA, 1371 Peachtree Street, NE., Suite 736, Atlanta, Georgia 30309.

9.0 REFERENCES AND BIBLIOGRAPHY

1. U.S. Army Corps of Engineers, Nashville District, Flood Plain Information Report, Lynn Camp and East Fork Lynn Camp Creeks, Corbin, Kentucky, May 1974.

2. ————, Nashville District, Feature Design Memorandum No. 1: Project Design Flood and Hydrological Impacts, Barbourville, Kentucky, October 1984.

3. U.S. Department of Commerce, Bureau of the Census, 1980 Census of Population, Number of Inhabitants, Kentucky, Washington, D.C., February 1982.

4. U.S. Geological Survey, Water Resources Investigations Report 76-62, Techniques for Estimating Magnitude and Frequency of Floods in Kentucky, C. H. Hannum, 1976.

5. ————, 7.5 Minute Series Topographic Maps, Scale 1:24000, Contour Interval 20 Feet: Corbin, Kentucky, 1978.

6. U.S. Army Corps of Engineers, Hydrologic Engineering Center, HEC-2 Water-Surface Profiles, Computer Program 723-X6-L202A, Davis, California, April 1984.

7. U.S. Department of Transportation, Federal Highway Administration, Report No. FHWA/RD-86/108, Bridge Waterways Analysis Model: Research Report, J. O. Shearman, W. H. Kirby, V. R. Snyder, and H. N. Flippo, July 1986.

8. U.S. Geological Survey, Water Supply Paper 1849, Roughness Characteristics of Natural Channels, H. H. Barnes, Jr., 1967.

9. U.S. Department of Housing and Urban Development, Federal Insurance Administration, Flood Hazard Boundary Map, Knox County, Unincorporated Areas, Kentucky, May 1977.

10. Federal Emergency Management Agency, Federal Insurance Administration, Flood Insurance Study, Bell County, Unincorporated Areas, Kentucky, February 1981.

11. ————, Flood Insurance Rate Map, Clay County, Unincorporated Areas, Kentucky, January 1987.

12. ————, Flood Insurance Study, Whitley County and Incorporated Areas, Kentucky, in progress.

13. U.S. Department of Housing and Urban Development, Federal Insurance Administration, Flood Insurance Study, City of Barbourville, Knox County, Kentucky, December 1977, revision in progress.

ELEVATION REFERENCE MARKS

REFERENCE MARK	FLOOD INSURANCE RATE MAP PANEL	ELEVATION (FEET NGVD)	DESCRIPTION OF LOCATION
1	0020	1,102.12	U.S. Coast & Geodetic disk stamped "F208 1951" set in top of south headwall of 6-foot concrete and stone culvert, located about 250 feet west of the intersection of School Street and State Route 1232
2	0020	1,100.41	U.S. Coast & Geodetic disk stamped "J204 1950" set in top of concrete post located about 700 feet east of intersection of CSX railroad and Indian Creek-Gray Road, about 32 feet south of south railroad track
3	0015	1,108.00	U.S. Coast & Geodetic disk stamped "L204 1950" set in top of concrete post located about 1,325 feet east of intersection of Industrial Boulevard and State Route 1232, about 33 feet south of centerline of State Route 1232
4	0015	1,093.46	U.S. Coast & Geodetic disk stamped "M204 1950" set on top of flat outcrop of rock located about 1.8 miles east of the CSX railroad station at Corbin, about 1,000 feet upstream of Moore Hill Avenue
5	0015	1,073.93	U.S. Coast & Geodetic disk stamped "N 204 1950" set in top of northwest concrete headwall of 30-inch pipe culvert located about 1.0 mile east along CSX railroad from station at Corbin, about 14 feet north of north railroad track

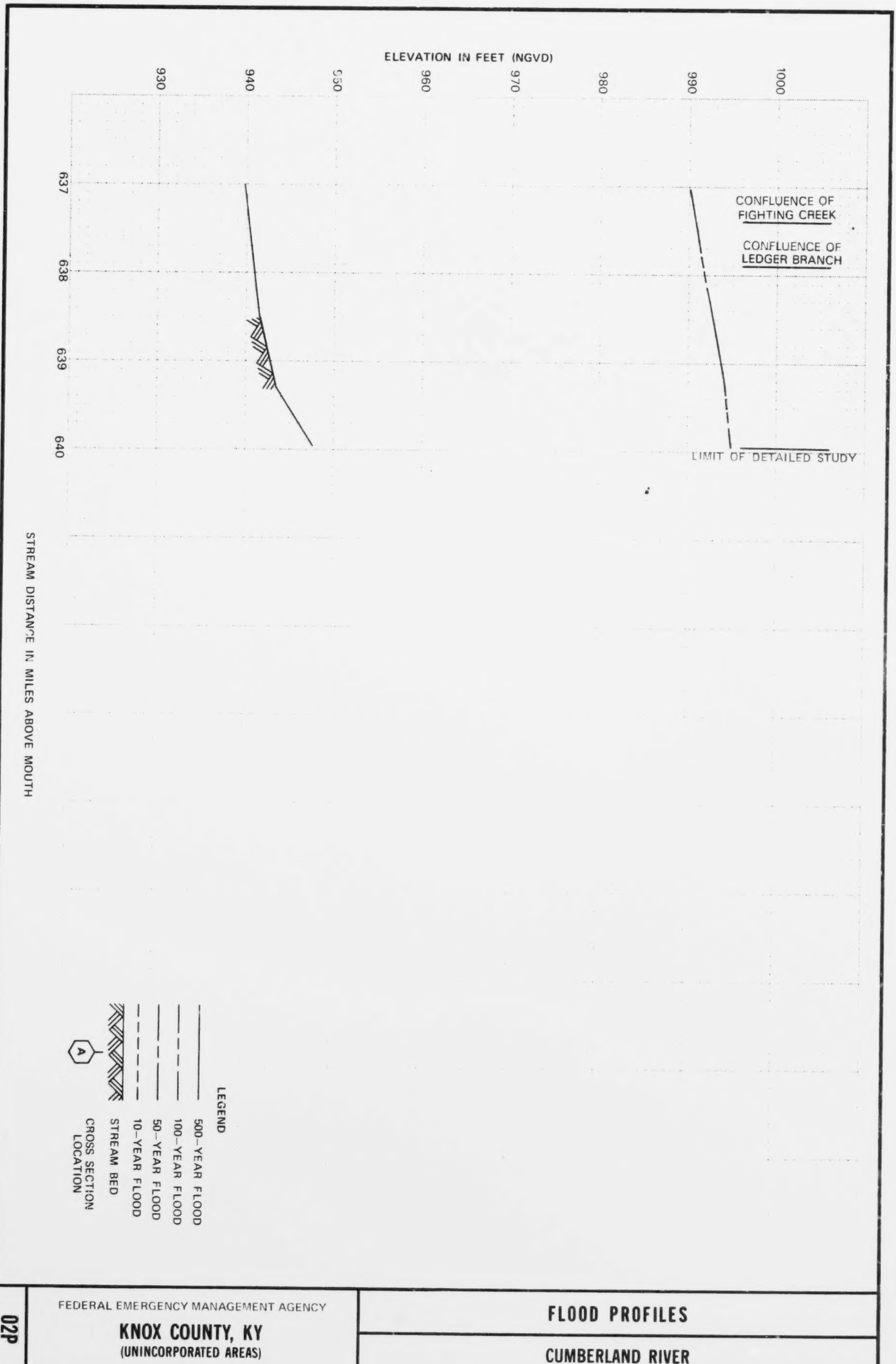
FLOOD PROFILES

CUMBERLAND RIVER

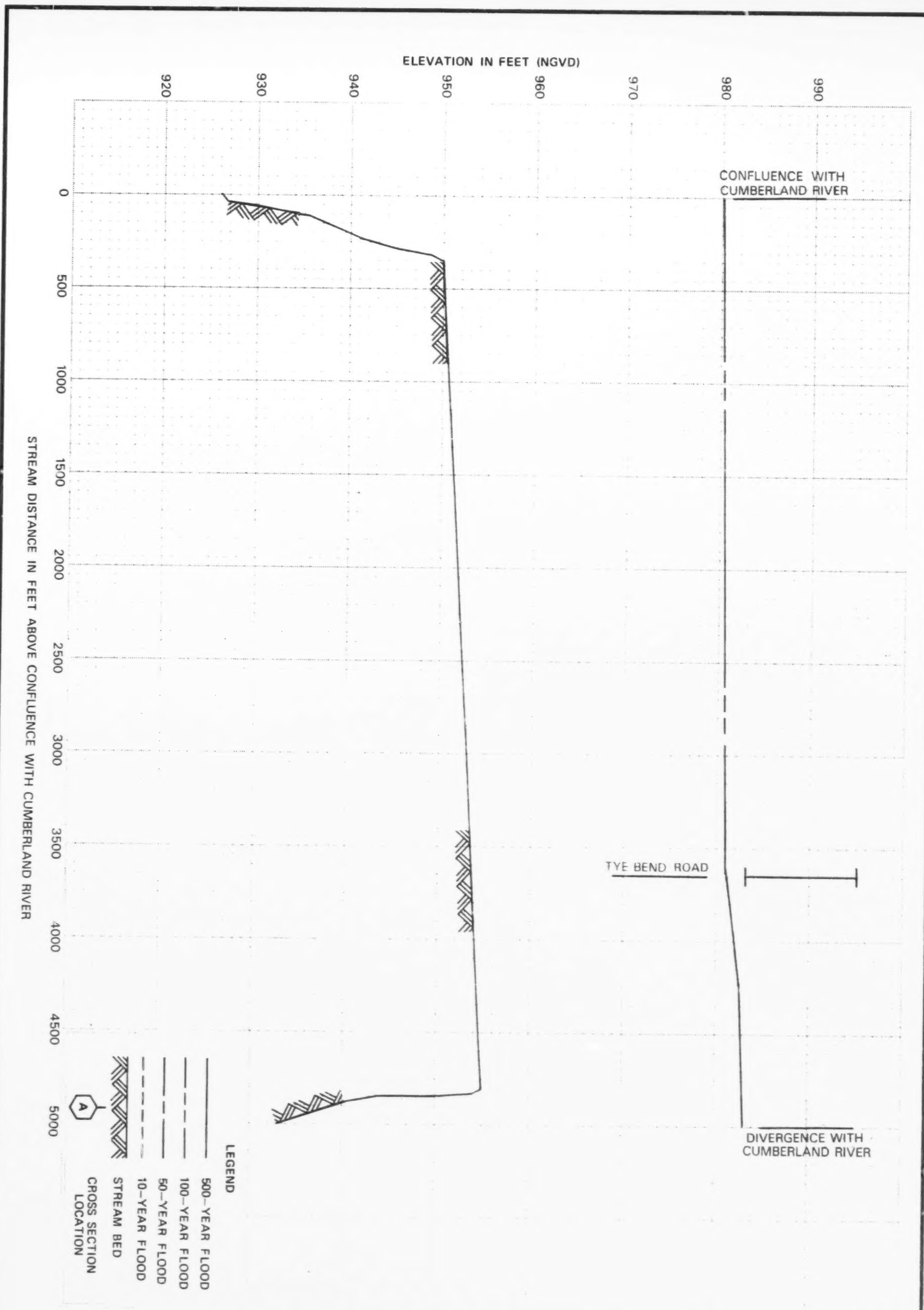
FEDERAL EMERGENCY MANAGEMENT AGENCY

KNOX COUNTY, KY
(UNINCORPORATED AREAS)

01P



02P	FEDERAL EMERGENCY MANAGEMENT AGENCY **KNOX COUNTY, KY** **(UNINCORPORATED AREAS)**	**FLOOD PROFILES** **CUMBERLAND RIVER**



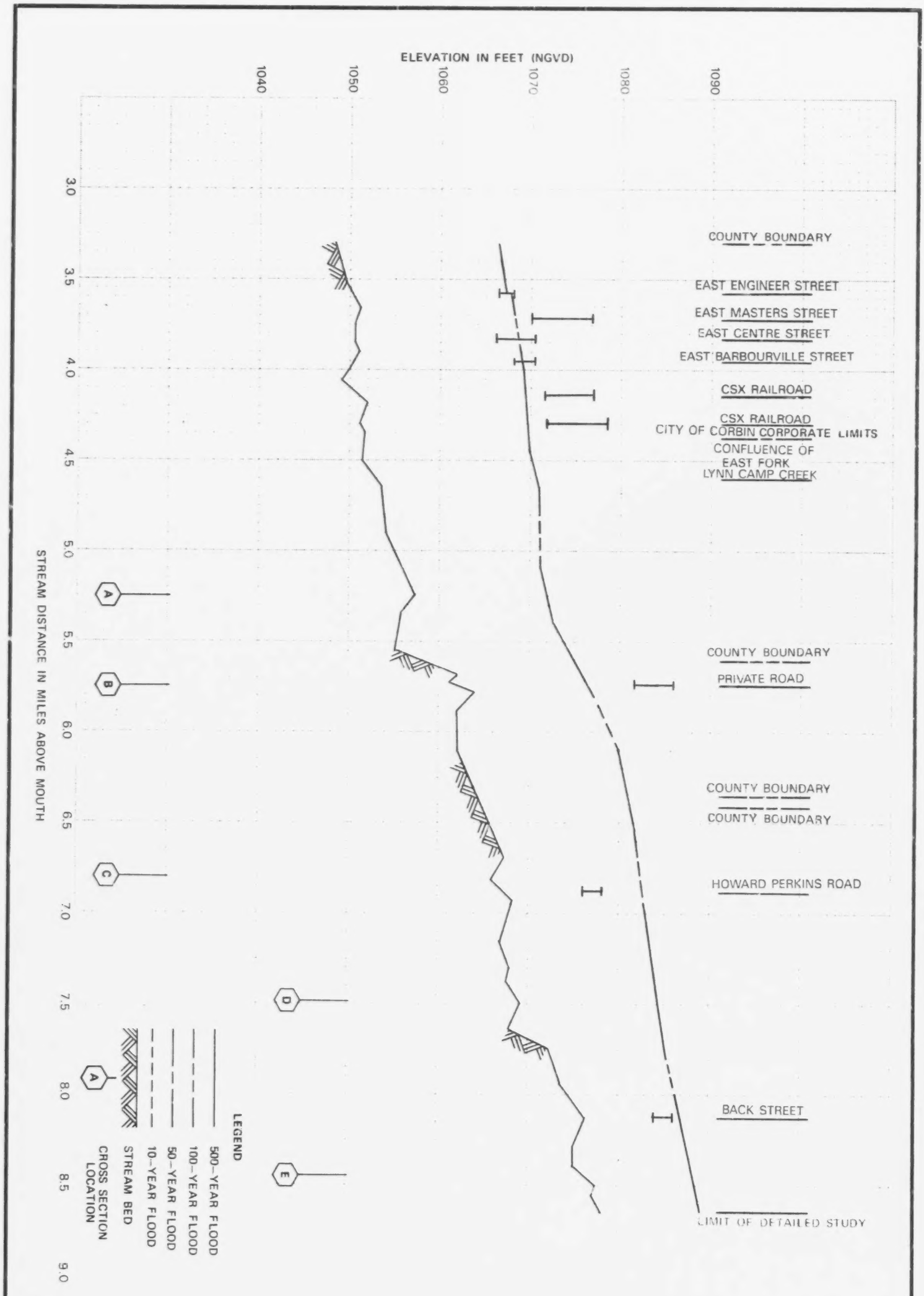
03P

FEDERAL EMERGENCY MANAGEMENT AGENCY

KNOX COUNTY, KY
(UNINCORPORATED AREAS)

FLOOD PROFILES

CUMBERLAND RIVER HIGH FLOW DIVERSION CHANNEL



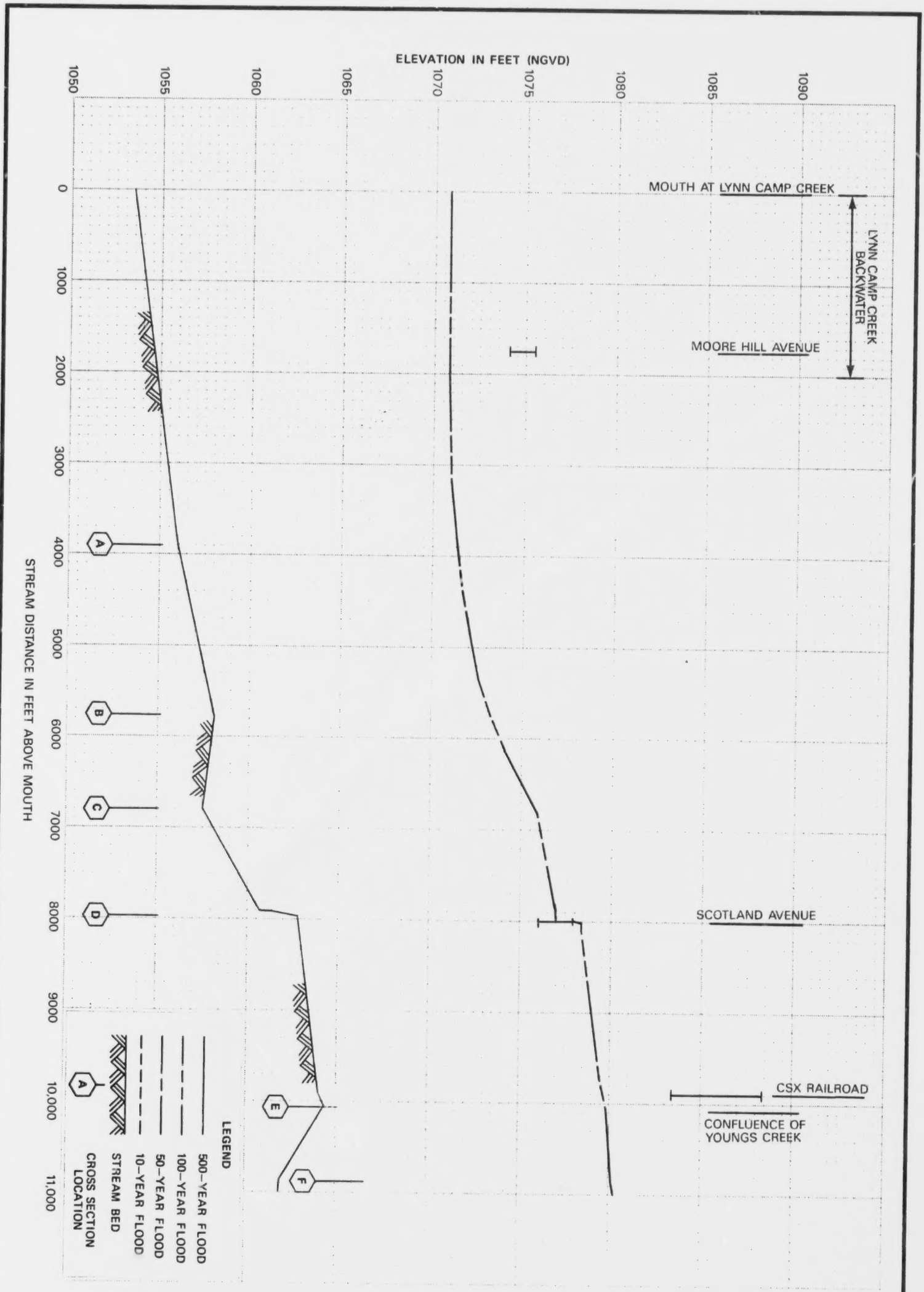
04P

FEDERAL EMERGENCY MANAGEMENT AGENCY

KNOX COUNTY, KY
(UNINCORPORATED AREAS)

FLOOD PROFILES

LYNN CAMP CREEK



05P

FEDERAL EMERGENCY MANAGEMENT AGENCY

KNOX COUNTY, KY
(UNINCORPORATED AREAS)

FLOOD PROFILES

EAST FORK LYNN CAMP CREEK

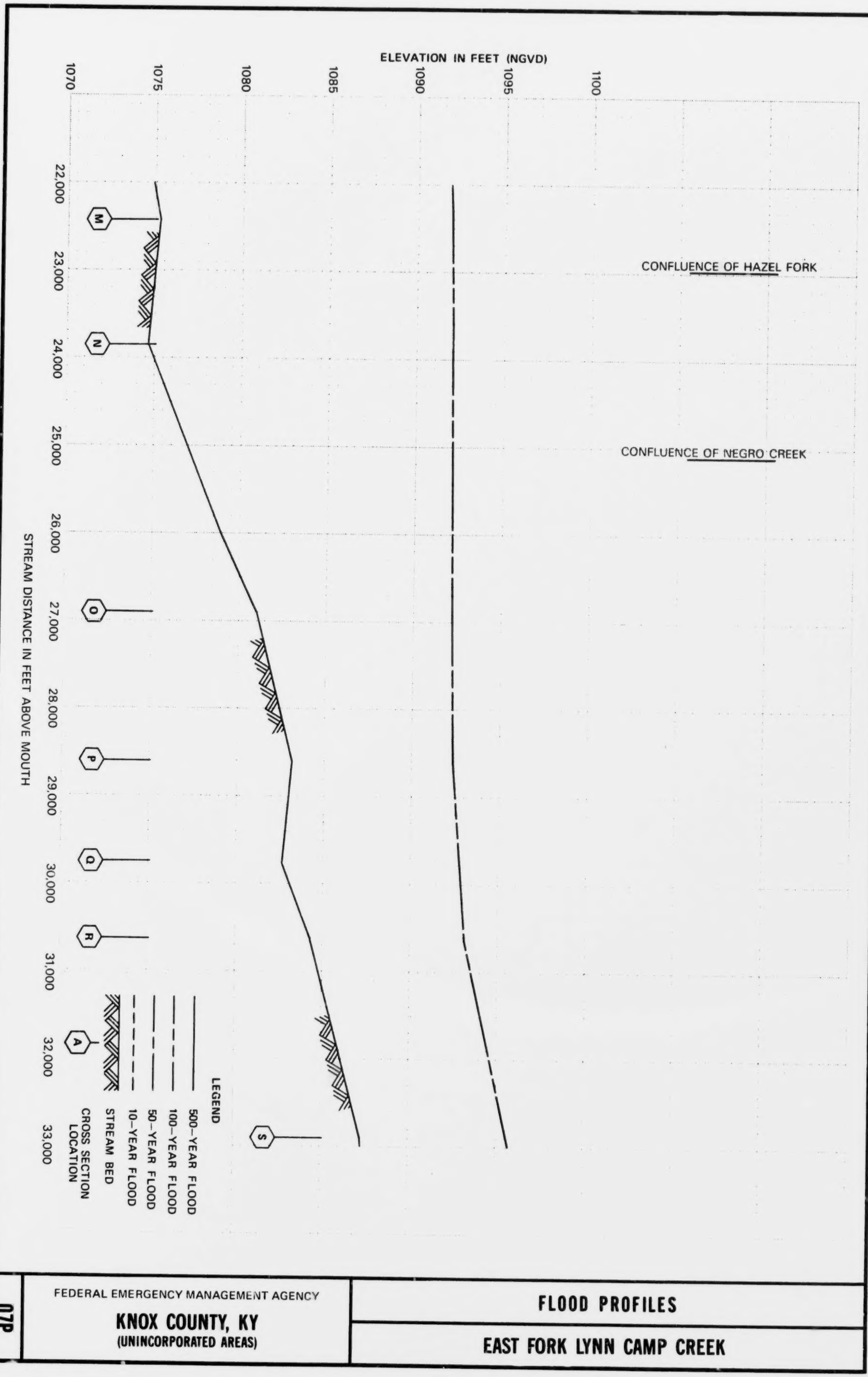
FLOOD PROFILES

EAST FORK LYNN CAMP CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

KNOX COUNTY, KY
(UNINCORPORATED AREAS)

06P



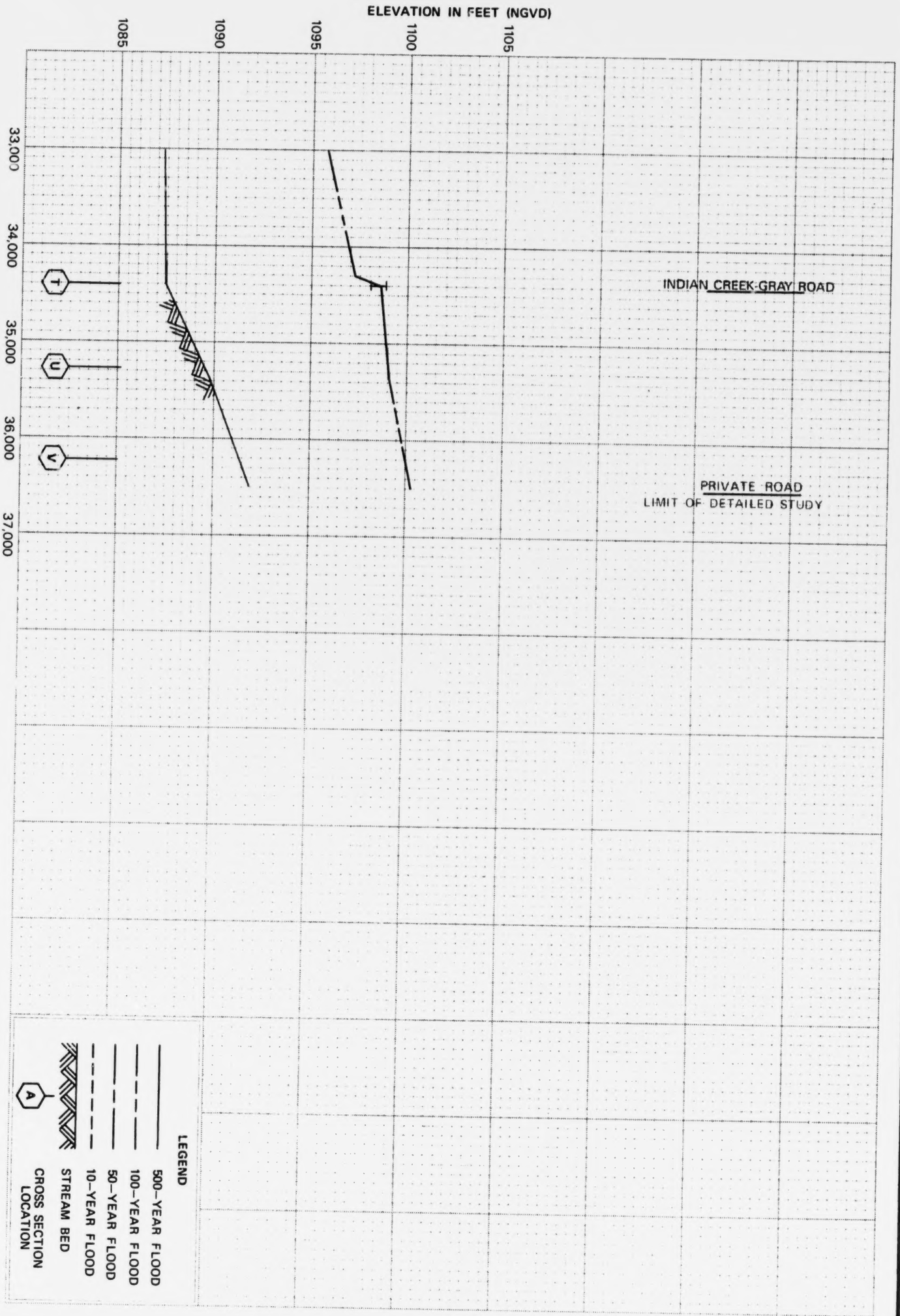
07P

FEDERAL EMERGENCY MANAGEMENT AGENCY

KNOX COUNTY, KY
(UNINCORPORATED AREAS)

FLOOD PROFILES

EAST FORK LYNN CAMP CREEK



08P	FEDERAL EMERGENCY MANAGEMENT AGENCY **KNOX COUNTY, KY** (UNINCORPORATED AREAS)	**FLOOD PROFILES** **EAST FORK LYNN CAMP CREEK**

FLOOD PROFILES

RICHLAND CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

KNOX COUNTY, KY
(UNINCORPORATED AREAS)

09P